SRI LANKA STANDARD 848 : PART 2 : 1989

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SPECIFICATION FOR

WOOD POLES FOR OVERHEAD POWER AND TELECOMMUNICATION LINES

PART 2 - SELECTION AND PREPARATION OF WOOD POLES FOR TREATMENT

SRI LANKA STANDARDS INSTITUTION

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PART 2 : SELECTION AND PREPARATION OF WOOD POLES FOR TREATMENT

SLS 848 : Part 2 : 1989
(Attached AMD 123)

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This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD

SPECIFICATION FOR WOOD POLES FOR OVERHEAD POWER AND TELECOMMUNICATION LINES

PART 2 : SELECTION AND PREPARATION OF WOOD POLES FOR TREATMENT

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 89.05.12, after the draft, finalized by the drafting committee on Wood Poles for Overhead Power and Telecommunication Lines, had been approved by the Electrical Engineering Divisional Committee.

The formulation of a standard on wood poles was felt necessary to achieve the following objectives.

a) Maintain quality and uniformity of production.
b) Ensure that poles are used according to their load capabilities.
c) Encourage the production of poles by the proper classification of all usable locally grown species.

This standard is in four parts, namely; Part 1 Terminology of wood poles; Part 2 Selection and preparation of wood poles for treatment; Part 3 Design data and pole classes; and Part 4 Tests to determine mechanical and physical properties of poles.

All values in this specification are given in SI units.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or an analysis shall be rounded off in accordance with **CS 102**. The number of significant figures to be retained in the rounded off value shall be the same as that of the specified value in this standard.

The assistance derived from publications of the American National Standards Institution and British Standards Institution, in the preparation of this standard is gratefully acknowledged.

1 SCOPE

This part of the standard identifies species of poles, and specifies the selection criteria of wood poles for preservative treatment. It also deals with seasoning, marking, storage, and handling.

2 REFERENCES

CS 102 Presentation of numerical values
SLS 428 Random sampling method
SLS 848 Wood poles for overhead powerand telecommunication -lines
Part 1 Terminology of wood poles
Part 3 Design data and pole classes.
SLS 859 Preservative treatment of wood poles with creosote.
SLS ...* Preservative treatment of wood poles with Copper Chrome Arsenic.

3 DEFINITIONS

The definitions given in **SLS 848 : Part 1**, shall apply for the purpose of this standard.

4 SPECIES

The poles shall be one of the following species:

a) Eucalyptus microcorys (Tallow wood);
b) Eucalyptus grandis (also called Eucalyptus saligna);
c) Alstonia macrophylla (Hawari nuga);
d) Mesua nagasarium (Naa); and
e) Dipterocarpus zeylanicus (Hora).

5 SEASONING

5.1 Air seasoning

Air seasoning is required for poles of all species listed in 4. Such air seasoning shall be sufficient to ensure conformance for preservative treatment.

5.2 Moisture content

Preservative treatment of pole species covered in this standard shall not be undertaken until the average moisture content of each batch of poles is reduced to less than 28 per cent. No individual pole in the batch shall have a moisture content greater than 30 per cent.

The moisture content of the poles shall be determined prior to treatment by the oven test method described in **Appendix A** or by the use of moisture meters. When using the latter, any measurements over 25 per cent shall be confirmed by the oven test method.

Poles for preservation shall be protected against heavy and continuous rain.
Seasoning is deemed to commence at the time of felling, and under average weather conditions, poles should be seasoned for at least two months before preservation.

** Under preparation*

6 CRITERIA FOR SELECTION

6.1 Bark inclusions
Depressions containing bark inclusions more than 50 mm in depth, measured from the surface of the pole shall not be permitted.

6.2 Compression wood
The outer 25 mm of all poles shall be free from compression wood visible on either end.

6.3 Cross breaks
Cross breaks shall not be permitted.

6.4 Dead streaks
Dead streaks shall not be permitted.

6.5 Decay
Decay shall not be permitted except as for decayed knots in **6.11**.

6.6 Defective butts
Hollowing in the butt caused by 'splinter pulling' in felling the tree shall be permitted, provided that the area of such a hollow is less than 10 per cent of the butt area.

6.7 Holes
Holes shall not be permitted, except holes for test purposes which shall be plugged.

6.8 Hollow butts or tops
Hollow butts or tops shall not be permitted, except as for **6.9** (Hollow pith centres) and **6.6** (Defective butts).

6.9 Hollow pith centres
Hollow pith centres in the tops or butts and in knots shall be permitted in poles that are to be given full-length preservative treatment.

6.10 Insect damage
Insect damage consisting of holes 2 mm or less in diameter or surface scoring or channelling shall be permitted. All other forms of insect damage shall not be permitted.

6.11 Knots
Knots of diameter greater than 75 mm shall not be permitted. Sum of diameters of all knots greater than 13 mm in any 300 mm length of pole shall not exceed 200 mm.

In the case of decayed knots, only type II decayed knots shall be permitted subject to the limits given above.

6.12 Marine borer damage
Marine borer damage shall not be permitted.

6.13 Nails, spikes and other metals
These shall not be permitted.

6.14 Sap stain
Sap stain that is not accompanied by softening or other disintegration (decay) of the wood shall be permitted.

6.15 Scars
Poles shall have no scars or turpentine cat faces located within 600 mm of the ground line. Turpentine scars need be trimmed only to the extent necessary for examination for evidence of fungus infection and for insect damage. Other sound scars shall be permitted elsewhere on the pole surface provided they are smoothly trimmed and do not interfere with the cutting of any gain, and provided that :

a) The circumference at any point on trimmed surfaces located between the butt and 600 mm below the ground line shall be not less than the minimum circumference specified at the ground line for the class and length of the pole ; and

b) The depth of the trimmed scar shall be not more than 50 mm, if the diameter is 250 mm or less, or 1/5 the pole diameter at the location of the scar if the diameter is more than 250 mm.

6.16 Scars (turpentine acid face)
Turpentine acid face scars, anywhere on the pole surface shall be permitted.

6.17 Shakes
Shakes in the butt surface which are not closer than 50 mm to the side surface of the pole shall be permitted, provided they do not extend to the ground line. Shakes or a combination of connected shakes which are closer than 50 mm to the side surface of the pole shall be permitted, provided they do not extend further than 600 mm from the butt surface and do not have an opening wider than 3 mm.

Shakes in the top surface shall not be permitted.

6.18 Spiral grain
Spiral grain (twist grain) is permitted as given in Table 1.

Table 1 - Permitted spiral grain

Length of pole (m)	Permitted maximum twist of grain
9 and under	1 complete twist in any 3.0 m
Over 9 and under 15	1 complete twist in any 4.5 m
15 and over	1 complete twist in any 6.0 m

6.19 Splits and checks

6.19.1 Splits and checks at the top of the pole shall not be permitted.

6.19.2 A split or a combination of two single checks, (each check terminating at the pith centre and separated by not less than 1/6 of the circumference) shall not extend upward along the pole more than 600 mm.

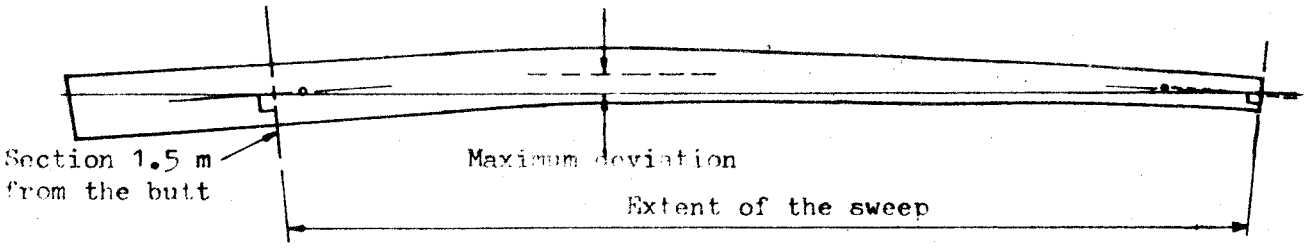
6.20 Straightness
Sweep or crook shall be permitted(see Figure 1 and Figure 2) to the extent that a straight line from the centre of the top to the centre of the pole 1.5 m from the butt remains within the pole.

6.21 Tension wood
The outer 25 mm of all poles shall be free from tension wood visible on either end.

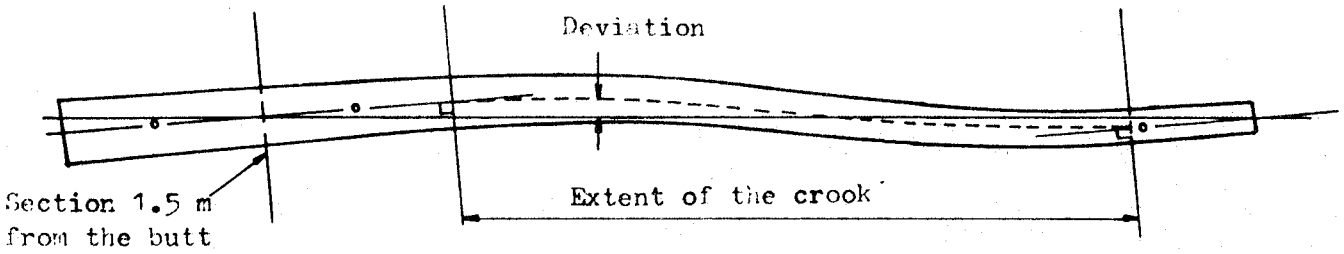
7 MEASUREMENT OF DIMENSIONS

7.1 Classified dimensions
For classified dimensions of poles, see Part 3 of this standard.

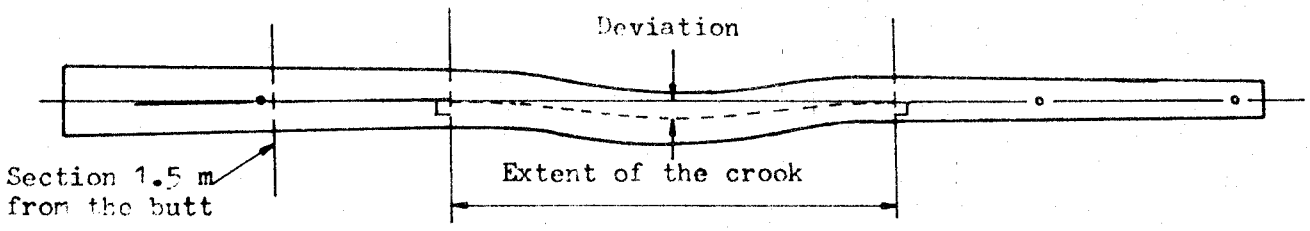
7.2 Length
Poles shall be not more than 75 mm shorter or 150 mm longer than nominal length. Length shall be measured between the extreme ends of the pole.



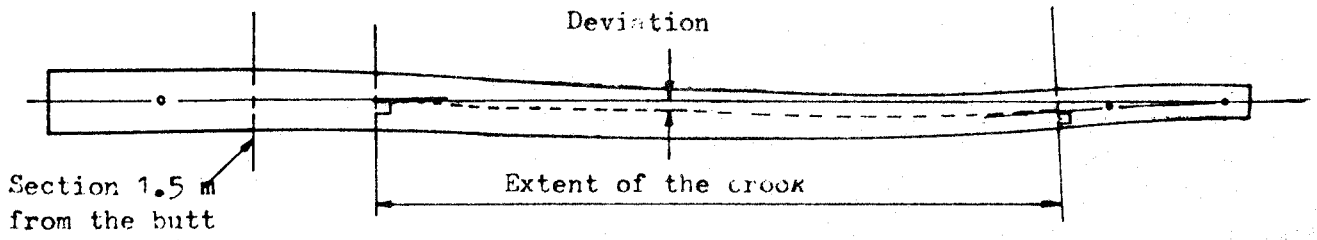
(a) Sweep



(b) Crook where axes of sections above and below the crook are approximately parallel



(c) Crook where axes of sections above and below the crook coincide or are practically coincident



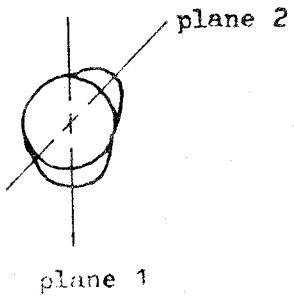
(d) Crook where axes of sections above and below the crook are not parallel or coincident with axis below the crook

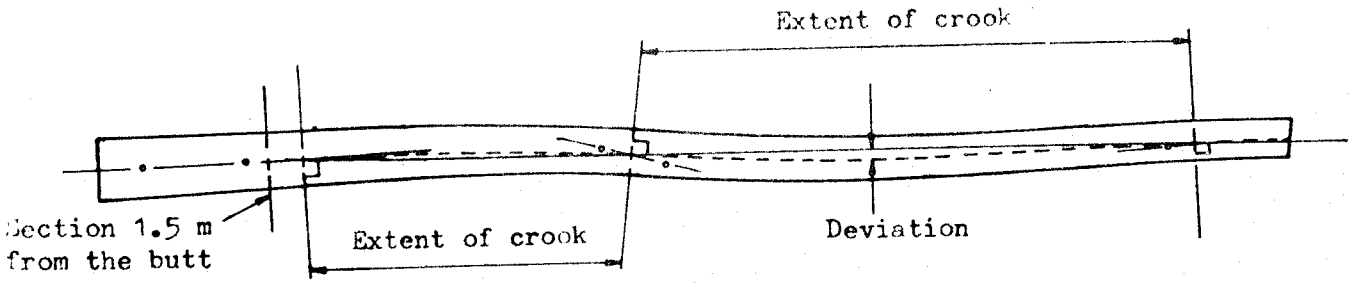
———— Line joining centre of the top to the centre of the pole at 1.5 m from the butt

———•——— Central axis of the pole where straight

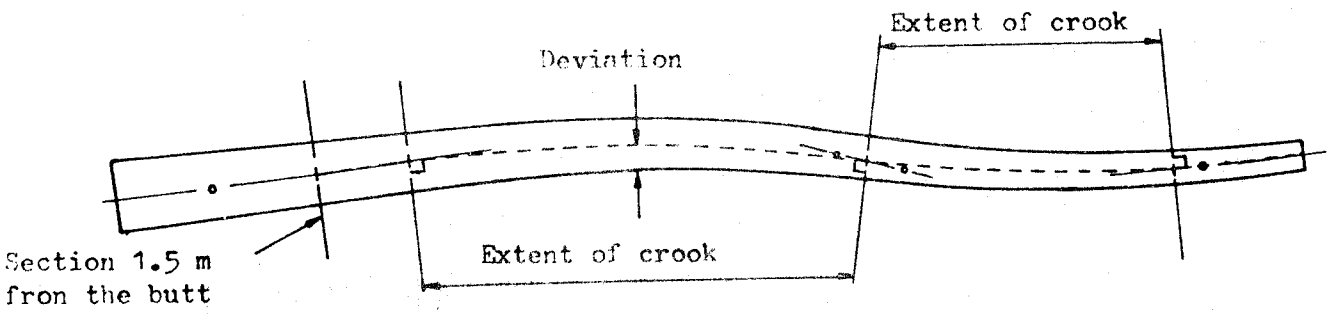
---------- Central axis of the pole where curved

FIGURE 1 - Permitted sweep and crook in one plane (see 6.20)





Longitudinal section on plane 1



Longitudinal section on plane 2

Two crooks in two planes

———— Line joining centre of the top to the centre of the pole at 1.5 m from the butt

——•—— Central axis of the pole where straight

-------- Central axis of the pole where curved

FIGURE 2 - Permitted sweep and crook (see 6.20)

7.3 Diameter
The diameter that determines the class shall be obtained as follows:
Measure the diameter at the ground line depending on nominal length of pole. This dimension and species will determine the true class of pole, provided that its top diameter is larger than 2/3 of the diameter at the ground line. Otherwise, the true class of the particular pole shall be reckoned to be that of a pole of the same species having a ground line diameter of 1.5 times the top diameter.

8 MANUFACTURING REQUIREMENTS

8.1 Bark removal
Outer bark shall be completely removed from all poles.
On all poles, no patch of inner bark more than 25 mm wide shall be left on the pole surface between the butt and 600 mm below the ground line.
No patch of inner bark larger than 25 mm wide and 150 mm long shall be left on the pole surface between the top and 600 mm below the ground line.

8.2 Sawing
All poles shall be neatly sawed at the top end and at the butt along a plane which shall not be out of square with the axis of the pole by more than 50 mm per 300 mm of diameter of the sawed surface. Bevelling at the edge of the sawed butt surface not more than 1/12 the butt diameter in width, or an equivalent area unsymmetrically located, is permitted.

8.3 Trimming
Completely overgrown knots, rising more than 25 mm above the pole surface, branch stubs, and partially overgrown knots shall be trimmed close. Completely overgrown knots less than 25 mm high need not be trimmed. Trimming may be done by shaving machine or by hand.

8.4 Shaving
If shaving is used, the depth of cut shall not be more than necessary to remove inner bark and to trim smoothly and closely all branch stubs and overgrown knots. There shall be no abrupt change in the contour of the pole surface between the ground line and the above ground sections. The lower 600mm of poles may be trimmed to remove wood fibres causing butt flare, provided sufficient sapwood remains to obtain minimum penetration requirements(see SLS 859 and SLS...*).

**Under preparation*

MARKING AND CODE LETTERS

9.1 Each pole shall be marked with the following information.

9.1.1 *Length of pole in metres.*

9.1.2 *Class of pole*
Each pole shall be marked with the following information depending on the pole class (see Part 3 of this standard).

H6, H5, H4, H3, H2, H1, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

9.1.3 *Species of Timber*
The species code shall be represented by two capital letters.

For example:

Eucalyptus microcorys	EM
Eucalyptus grandis/saligna	EG
Alstonia macrophylla	AM
Mesua nagasarium	MN
Dipterocarpus zeylanicus	DZ

9.1.4 *The year of preservation.*

The year of preservation shall be represented by its last two digits.
For example:

1986	86
1987	87

9.1.5 *Preservative used other than creosote.*
For example:

Copper-Chromium-Arsenic salts	CCA

9.1.6 *Identification mark of preserver.*
For example

State Timber Corporation	STC

9.1.7 *Country of origin (for imported poles only).*
For example:

Malaysia	ML
Burma	BM
Thailand	TL
Finland	F

10 METHODS OF MARKING

Each pole shall be marked in either of the following two methods.

10.1 Each pole shall be gouged or branded with markings listed in 9.1.1 to 9.1.7 with characters 25 mm high, 5 mm wide and 3 mm deep.
Characters shall be 30 mm below each other.

10.1.1 Marking shall be done as in Figure 3a with the length and class of pole marked 3 m from the butt end and the preservers name or mark at least 2.7 m from the butt end.

10.2 Alternatively a non-corrosive metal tag of suitable shape and dimensions shall be securely fixed to the pole at a distance of 3m from the butt end. Characters in the tag shall be marked 10 mm below each other (see Figure 3b)and characters shall be 10 mm high, 5 mm wide and 1 mm deep. Marking shall be die stamped.

10.3 At the butt of the pole, true diameter class numerals and numerals showing the length of the pole shall be die-stamped or hammer-stamped or displayed on a securely fixed metal tag (non-corrosive) for the purpose of ready identification of class and length.

11 SAMPLING AND CRITERIA FOR CONFORMITY

11.1 Lot

All wood poles of similar species and same dimension belonging to one batch of supply and satisfying 11.4.1 shall constitute a lot.

11.2 General requirements

11.2.1 Each wood pole in the batch of supply shall be visually inspected before treatment of wood poles.

11.2.2 Only those complying with the requirements and satisfying stipulations in regard to defects, shall be considered to constitute a lot.

NOTE

Inspection of wood poles shall preferably be carried out while unloading from a vehicle or stacking for seasoning.

11.3 Scale of sampling

11.3.1 Before selecting a sample of wood poles, each wood pole in the lot shall be visually inspected for requirements and defects as mentioned in 11.4.1.

11.3.2 The number of wood poles to be selected for the sample shall be in accordance with column 1 and column 2 of Table 2.

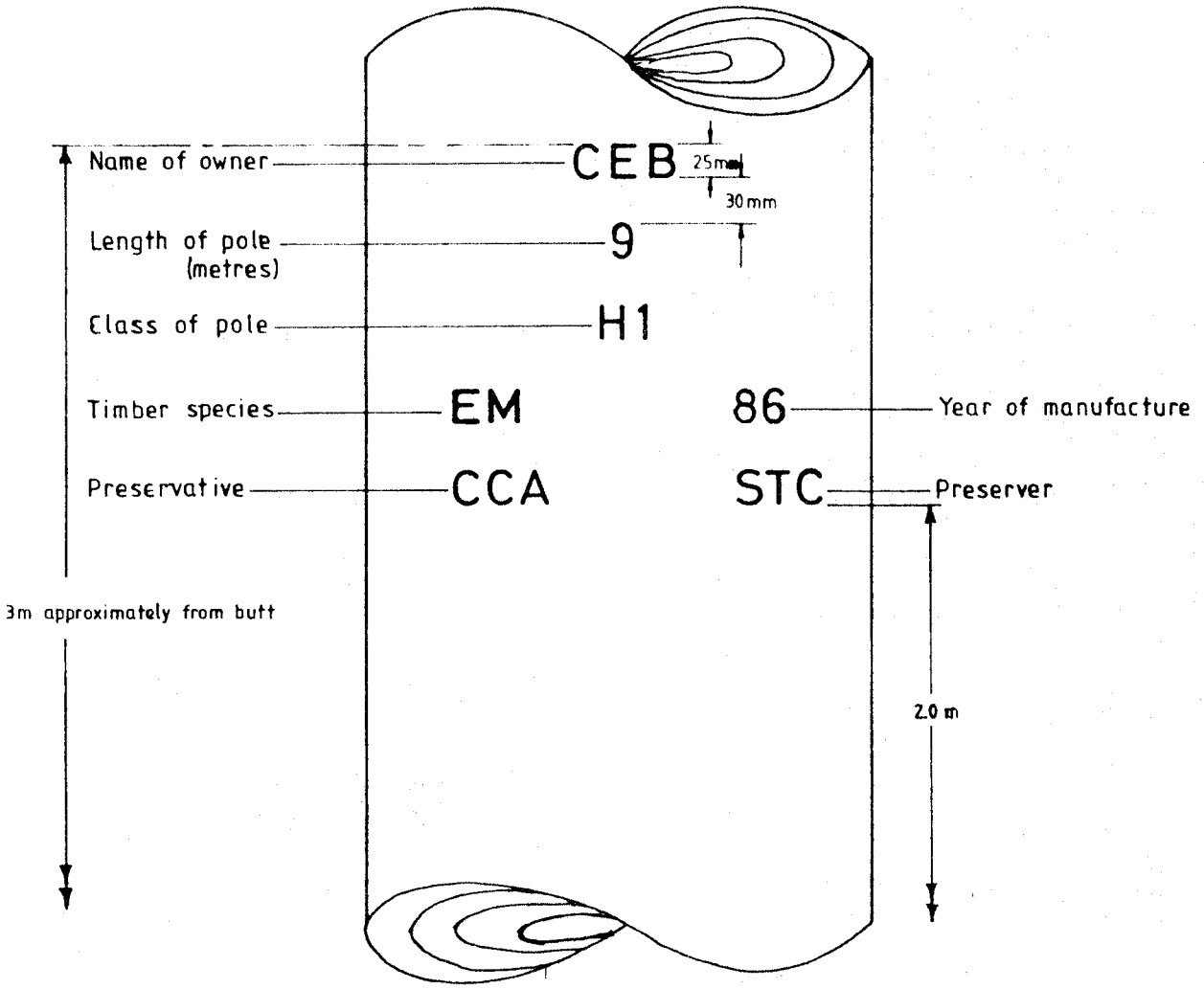


FIGURE 3a - Marking on pole

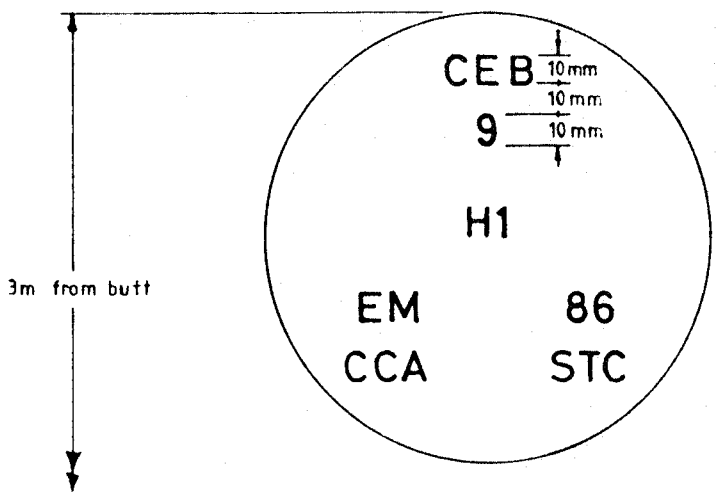


FIGURE 3b - Marking on tag

TABLE 2 - Scale of sampling

Number of wood poles in the lot	Number of wood poles to be selected	* Acceptance number	Sub sample size
up to 90	5	0	2
91 to 150	8	0	2
151 to 500	13	1	3
501 to 1200	20	2	3
1201 and above	32	3	5

**See 11.5.3*

11.3.2 The wood poles shall be selected so as to ensure randomness of selection. Random number tables as given in **SLS 428** shall be used.

11.4 Number of tests

11.4.1 Each wood pole in the lot shall be inspected for the following requirements and defects.

Species (4)
Bark inclusion (6.1)
Compression wood (6.2)
Cross breaks (6.3)
Dead streaks (6.4)
Decay (6.5)
Defective butts (6.6)
Hollow butts or tops (6.8)
Hollow pith centres (6.9)
Knots (6.11)
Marine borer damage (6.12)
Nails (6.13)
Sap stain (6.14)
Scars (6.15 and 6.16)
Splits and checks (6.19)
Straightness (6.20)
Tension wood (6.21)
Dimensions (7)

11.4.2 Each wood pole of the sample selected as in **11.3.2** shall be inspected for the following defects.

Holes (6.7)
Insect damage (6.10)
Shakes (6.17)
Spiral grain (6.18)
Manufacturing requirements (8)

11.4.3 A sub sample of size as given in column 4 of Table 2 shall be selected from the sample selected as in 11.3.1 and subjected to the tests to determine mechanical properties of wood poles as given in SLS 848 : Part 4.

11.5 **Criteria for conformity**
A lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied.

11.5.1 Each wood pole inspected as in 11.4.1 satisfies the relevant requirements.

11.5.2 Each wood pole satisfies the marking requirement (9).

11.5.3 The number of wood poles not conforming to any one or more defects when inspected as in 11.4.2, is less than or equal to the corresponding acceptance number given in column 3 of Table 2.

11.5.4 Each wood pole tested as in 11.4.3 shall have a modulus of elasticity and an ultimate bending strength not less than that indicated for the species in Table 2 of SLS 849 : part 3 : 1989.

12 STORAGE AND HANDLING

12.1 STORAGE
When it is necessary to hold poles in storage, they shall be stacked on treated or other non decaying skids of such dimensions, and so arranged, as to support the poles without producing noticeable distortion of any of them. The height of the piles shall be limited to avoid damage to poles on the bottom layers.
Poles shall be piled and supported in such a manner that all poles are at least 300 mm above the general ground level. Ground under and around the stacks shall be well drained. No decayed or decaying wood, bark, shavings, grass and weeds shall be permitted to remain underneath stored poles.

12.2 Handling
Poles shall not be dragged along the ground. Cant hooks, pole tongs, or other pointed tools shall not be applied to the ground line section on any pole.

12.3 Mechanical damage

Poles are not acceptable if they contain indentations attributed to loading or handling slings that are 6 mm or more deep over 20 per cent or more of the pole circumference, or more than 13 mm deep at any point. Other indentations or abrasions, for example, forklift damage, chain-saw damage etc., when permitted shall not be more than 1/10 the pole diameter at the point of damage up to a maximum of 25 mm. Such damage is permitted in an oversized section, where the excess of wood shall be taken into consideration in evaluating the effects of the damage. In any case the circumference of poles, measured along the surface, at the damaged location for a given class is still required to be not less than the minimum specified.

APPENDIX A

DETERMINATION OF MOISTURE CONTENT BY THE OVEN TEST METHOD

A.1 Sampling
Samples of 75 mm or the full depth of the sapwood, whichever is the greater, shall be taken from the poles, at a point not less than 1.5 m from either end of the pole, by means of a test borer consisting of a hollow auger and extractor. The poles shall be carefully plugged, with durable or preservative treated plugs, as soon as the samples have been extracted.

A.2 Procedure
Weigh the sample (m_1) immediately after extraction. Dry the samples in an oven at a temperature of 103 + 2 ^{o}C until the mass is constant, and again weigh immediately after removal from the drying oven (m_2).

A.3 Calculation
The moisture content (w) expressed as a percentage of the oven dry mass is calculated from the equation :

$$w = \frac{m_1 - m_2}{m_2} \times 100$$

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AMD. 123.

Amendment No. 1 approved on 89-09-07 to SLS 848 : Part 2 : 1989 SRI LANKA STANDARDS SPECIFICATION FOR WOOD POLES FOR OVERHEAD POWER AND TELECOMMUNICATION LINES

Page 11

Insert the following after clause 10 and renumber the existing clause 11 as 12.

11 SAMPLING AND CRITERIA FOR CONFORMITY

11.1 Lot

All wood poles of similar species and same dimension belonging to one batch of supply and satisfying 11.4.1 shall constitute a lot.

11.2 General requirements

11.2.1 Each wood pole in the batch of supply shall be visually inspected before treatment of wood poles.

11.2.2 Only those complying with the requirements and satisfying stipulations in regard to defects, shall be considered to constitute a lot.

NOTE
Inspection of wood poles shall preferably be carried out while unloading from a vehicle or stacking for seasoning.

11.3 Scale of sampling

11.3.1 Before selecting a sample of wood poles, each wood pole in the lot shall be visually inspected for requirements and defects as mentioned in **11.4.1.**

11.3.2 The number of wood poles to be selected for the sample shall be in accordance with column 1 and column 2 of Table 2.

TABLE 2 - Scale of sampling

Number of wood poles in the lot	Number of wood poles to be selected	* Acceptance number	Sub sample size
up to 90	5	0	2
91 to 150	8	0	2
151 to 500	13	1	3
501 to 1200	20	2	3
1201 and above	32	3	5

*See 11.5.3

11.3.2 The wood poles shall be selected so as to ensure randomness of selection. Random number tables as given in SLS 428 shall be used.

11.4 Number of tests

11.4.1 Each wood pole in the lot shall be inspected for the following requirements and defects.

Species (4)
Bark inclusion (6.1)
Compression wood (6.2)
Cross breaks (6.3)
Dead streaks (6.4)
Decay (6.5)
Defective butts (6.6)
Hollow butts or tops (6.8)
Hollow pith centres (6.9)
Knots (6.11)
Marine borer damage (6.12)
Nails (6.13)
Sap stain (6.14)
Scars (6.15 and 6.16)
Splits and checks (6.19)
Straightness (6.20)
Tension wood (6.21)
Dimensions (7)

11.4.2 Each wood pole of the sample selected as in 11.3.2 shall be inspected for the following defects.

Holes (6.7)
Insect damage (6.10)
Shakes (6.17)
Spiral grain (6.18)
Manufacturing requirements (8)

11.4.3 A sub sample of size as given in column 4 of Table 2 shall be selected from the sample selected as in 11.3.1 and subjected to the tests to determine mechanical properties of wood poles as given in SLS 848 : Part 4.

11.5 Criteria for conformity

A lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied.

11.5.1 Each wood pole inspected as in 11.4.1 satisfies the relevant requirements.

11.5.2 Each wood pole satisfies the marking requirement (9).

11.5.3 The number of wood poles not conforming to any one or more defects when inspected as in **11.4.2,** is less than or equal to the corresponding acceptance number given in column 3 of Table 2.

11.5.4 Each wood pole tested as in **11.4.3** shall have a modulus of elasticity and an ultimate bending strength not less than that indicated for the species in Table 2 of **SLS 849 : part 3 : 1989.**

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